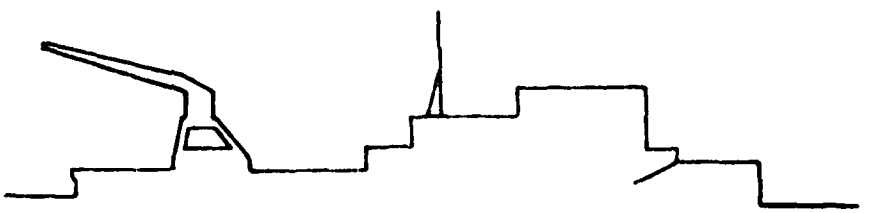

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CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
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Naval Ocean Systems Center, (NOSC) has tasked Chesapeake Division, Naval Facilities Engineering Command, (CHESNAVFACENGCOM) with the installation of two FORACS (Fleet Operational Readiness Accuracy Check Site) Targets at the Atlantic Underwater Testing and Evaluation Center (AUTEC), & one FORACS (Con't)

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Target and one SSRNM (Surface Ship Radiated Noise Measurement Array at the St. Croix Underwater Tracking Range (UTR). The construction will be performed with the Ocean Construction Platform SEACON and Underwater Construction Team One (UCT-1).

(1)

PROJECT EXECUTION PLAN

FOR THE INSTALLATION OF

TWO FORACS TARGETS AT AUTEC

AND

ONE FORACS TARGET AND ONE SSRNM ARRAY

AT ST. CROIX UTR

FPO-1-84(1)

March 1984

Enclosure (1)

TABLE OF CONTENTS

LIST OF FIGURES

1.0 GENERAL

1.1 Background

Naval Ocean Systems Center, (NOSC) has tasked Chesapeake Division, Naval Facilities Engineering Command, (CHESNAVFAC-ENGCOM) with the installation of two FORACS (Fleet Operational Readiness Accuracy Check Site) Targets at the Atlantic Underwater Testing and Evaluation Center (AUTEC), and one FORACS Target and one SSRNM (Surface Ship Radiated Noise Measurement) Array at the St. Croix Underwater Tracking Range (UTR). The construction will be performed with the Ocean Construction Platform SEACON and Underwater Construction Team One (UCT-1).

1.2 Organizational Responsibilities

The following is a list of the major contributors to project execution. Additional details as necessary may be found in the body of this Plan.

1.2.1 CHESNAVFACENGCOM

CHESNAVFACENGCOM will:

a. prepare a Project Execution Plan.
b. coordinate project execution with NOSC, AUTEC, Atlantic Fleet Weapons Training Facility (AFWTF), St. Croix UTR, UCT-1, and APL.
c. provide SEACON and crew.
d. provide winches and additional cable laying equipment.
e. provide on site technical supervision and field engineering support.
f. provide project logistics including messing and berthing for all on-site project personnel.
g. set up and operate Mini-Ranger at AUTEC and St. Croix UTR.
h. provide all radios required for project communications.
i. provide hardware for attaching cables to existing strain relief devices.
j. arrange for pier space at Roosevelt Roads, PR and Fredriksted, St. Croix, USVI.
k. document construction operations.
l. prepare a Project Completion Report and as-built drawings.

1.2.2 NOSC

NOSC will be responsible to:

a. provide project funding.

b. provide general coordination among CHESNAVFACENGCOM, AFWTF, AUTEC, St. Croix UTP, and APL.
c. provide cable, hydrophones and structures for SSRNM array.
d. provide electronic specialists for SSRNM installation.
e. assemble SSRNM junction boxes.
f. provide all SSRNM electronic testing equipment.
g. test SSRNM hydrophones and cable.

1.2.3 Applied Physics Laboratory

APL will be responsible to:

a. provide electronic specialists for FORACS target installations.
b. assemble FORACS structures.
c. assemble FORACS junction boxes.
d. provide FORACS testing equipment.
e. test FORACS hydrophones and cable.
f. supply final approval for FORACS target locations.

1.2.4 Underwater Construction Team One

UCT-1 will be responsible to:

a. provide Petty Officer in Charge (POIC) and personnel to perform in water/underwater construction tasks.
b. provide diving gear and small craft.
c. provide for all diving safety including medical evacuation and use of a recompression chamber.
d. provide personnel for SEACON deck force.
e. provide personnel for shore end operations.
f. furnish input to operation tasks.
g. arrange for rough terrain forklift for shore landing at St. Croix.

1.2.5 AUTEC

AUTEC will be responsible to:

a. provide divers to locate and mark shallow water FORACS site.
b. provide divers to locate and mark cable anchor.
c. provide divers to locate and mark near shore location for SEACON.
d. mark centerline of reef for Mike boat path.
e. clear cable trench.
f. provide batteries for Mini-Ranger transponders.
g. provide on site logistics.
h. provide on site transportation of equipment and personnel.

i. provide work boat.
j. provide range tracking as backup for Mini-Ranger.
k. provide radios for communication between SEACON and range.
l. provide rough terrain forklift and bulldozer for shore landing at AUTEC.

1.2.6 St. Croix UTR

St. Croix UTR will be responsible to:

a. provide on site transportation of equipment and personnel.
b. provide on site logistics.
c. provide range tracking as backup for Mini-Ranger.
d. provide radios for communication between SEACON and range.

1.3 On Site Navigation

The primary navigation system will be the Motorola Mini-Ranger system on board SEACON. System transponders will be placed at selected shore sites for the cable installation. Appendix A details specific information regarding the system's operation, specific site data and secondary back up navigation requirements.

1.4 Weather Planning/Predictions

By consulting the SSMO's for the operation regions, the following weather conditions should be expected:

AUTEC: Clear, visibility at least 10 NM, easterly to southeasterly winds of approximately 10 knots throughout the day, temperature of 75° F, 80% relative humidity, seas 1-2 feet.

St. Croix: Clear, visibility at least 10 NM, easterly winds of approximately 12 knots throughout the day, temperature of 76° F, 75% relative humidity, seas 2-4 feet.

Additional daily weather forecasts will be obtained on board SEACON as an aid to final planning and operations.

1.5 Project Schedule

Date	Action
6 - 8 February	Mobilize SEACON at CHESDIVSUPPFAC, St. Juliens Creek, Portsmouth, VA.
9 February	Self-transit St. Juliens Creek to NAB Little Creek, Norfolk, VA, UCT-1.
10 - 12 February	Mobilize SEACON for OP-TOW.
13 - 18 February	Transit Little Creek to Port Everglades, FL., under tow by USS PAPAGO, ATF-160.
18 Feb. - 30 March	Mobilize SEACON at Port Everglades, FL.
31 March - 1 April	Self-transit Port Everglades, FL. to AUTEC, Andros Island, Bahamas.
2 - 3 April	On site mobilization
4 - 5 April	Install FORACS Targets
6 April	On site demobilization
7 April	Weather contingency
8 - 15 April	Transit to Fredriksted, St. Croix, USVI via NAVSTA Roosevelt Roads, PR, under tow by USS PAIUTE, ATF-159.
16 - 17 April	On site mobilization
18 April	Install FORACS Target
19 April	Install SSRNM Array
20 April	On site demobilization
21 April	Weather contingency
22 - 28 April	Transit to Port Everglades, FL via Roosevelt Roads, PR, under tow by USS PAIUTE, ATF-159.
28 April - 3 May	Demobilize SEACON at Port Everglades, FL

2.0 MOBILIZATION

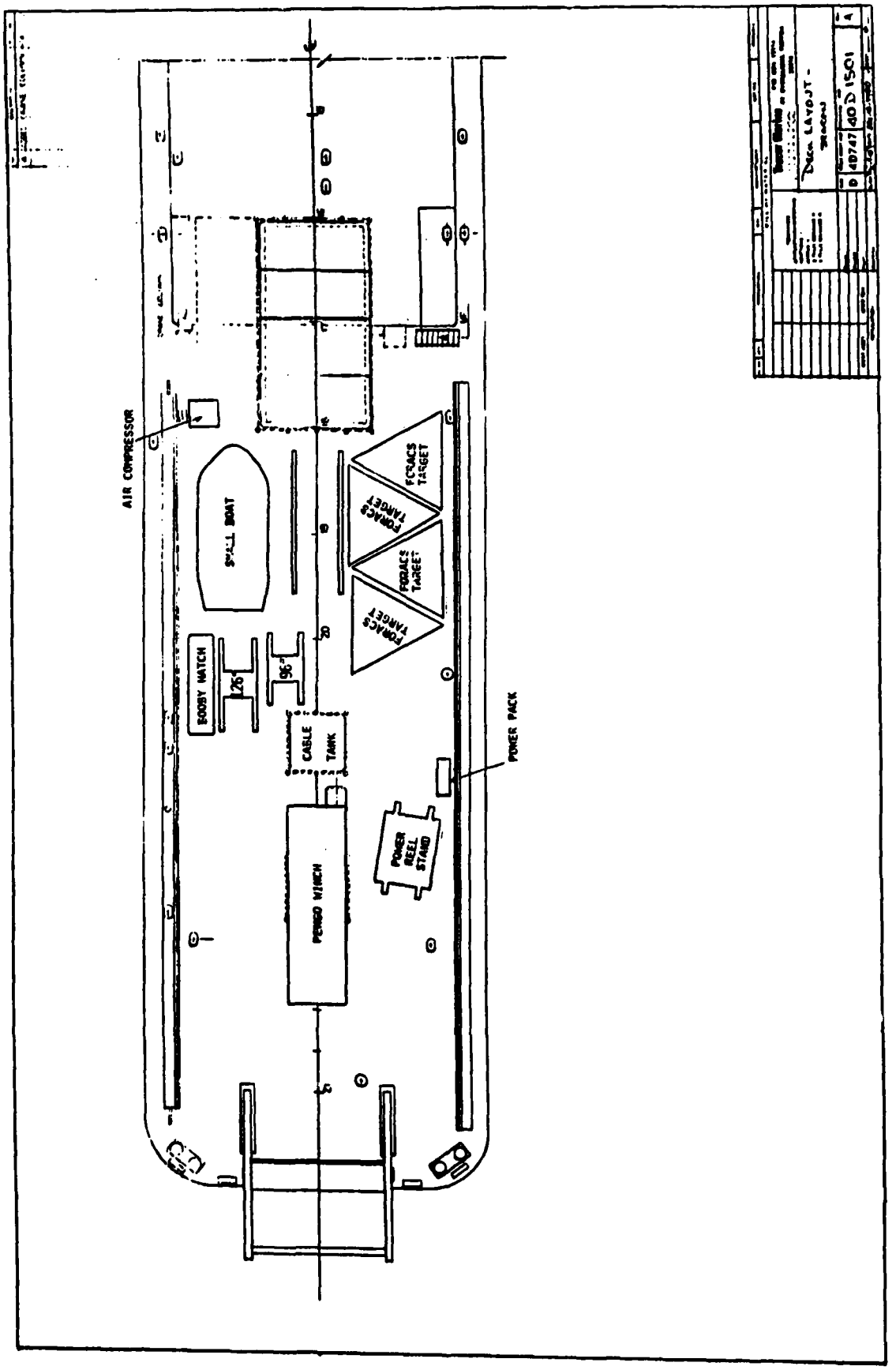
Equipment from the Ocean Construction Equipment Inventory (OCEI) will be loaded onboard the SEACON at St. Juliens Creek Annex, Naval Amphibious Base, Portsmouth, VA. This equipment will include a Pengo winch, an 18k Skagit winch, a powered reel stand with power pack, spare Pengo reels, and sheaves, line, floats, etc., needed to complete the assigned mission. A Pengo reel loaded with the FORACS cable for AUTEC operations will also be loaded at St. Juliens Creek. A complete equipment list accompanies this Plan as Appendix B. Tie down operations will be under CHESNAVFACENGCOM supervision.

The platform will be rigged for tow in accordance with CHESNAVFACENGCOMINST 5321.1A. The Commanding Officer of the assigned tow vessel will inspect and approve all towing gear, deck rigging, and loading prior to accepting the OCP SEACON for tow.

The OCP SEACON will be towed to Port Everglades, FL for prepositioning for the project. Final mobilization will take place at Tracor Marine, Inc., Port Everglades. This activity will include:

a. Receiving and onloading the SSRNM shore cable into the OCP SEACON cable tank.
b. Receiving and onloading the SSRNM array.
c. Receiving and onloading UCT-1 equipment . (See equipment list in Appendix B).
d. Receiving FORACS targets.
e. Providing staging area for assembly and test of FORACS targets by Applied Physics Laboratory (APL) personnel.
f. Onloading FORACS targets.
g. Connecting the FORACS cable to the transducer through the junction chamber/strain relief assembly, testing the assembly, and connecting the assembly to the target frame, for the first FORACS target installation.
h. Completing OCP SEACON deck set-up for operation (See Deck Plan, figure (1)).

CHESNAVFACENGCOM will arrange shipment of the Mini-Ranger transponders to AUTEC. These will be set-up by CHESNAVFACENGCOM prior to the arrival of the OCP SEACON at AUTEC.



SEACON Deck Plan Figure (1)

3.0 OPERATIONS PLAN FOR AUTEC

This section describes the installation of two FORACS Targets at AUTEC. The proposed installation locations are detailed in Appendix A. The site plan is shown in that appendix as figure (A-1).

3.1 Construction Operations

FORACS targets are installed by an ocean to shore technique. The target is lowered to the seafloor by the transmission cable. Upon placement of the structure on the bottom, a cable laying procedure is executed. A FORACS target is shown in figure (2). Two targets will be installed at AUTEC. Their intended implantation coordinates, and cable tracks are given in Appendix A. The installation scenario is detailed below.

3.1.1 Site Preparation

Site preparation will begin prior to the arrival of SEACON at AUTEC. The activity responsible for each step of this set-up is specified below as appropriate.

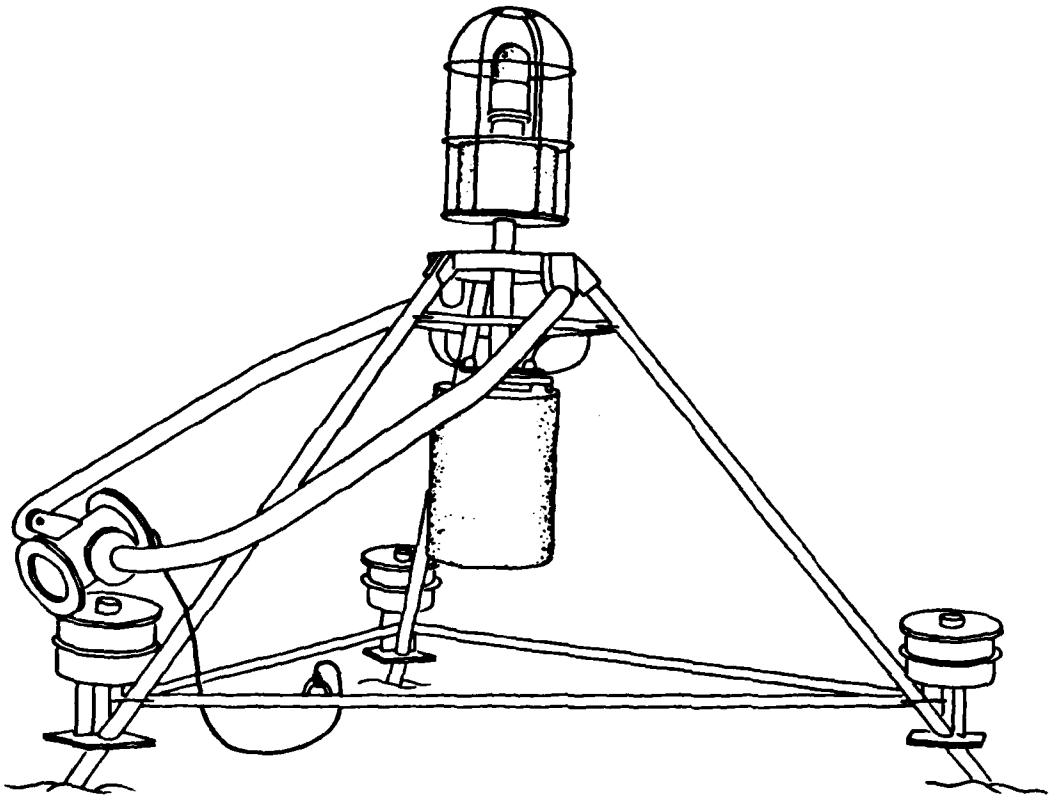
3.1.1.1 Pre-arrival Preparation

Prior to the arrival of SEACON at AUTEC, AUTEC divers will locate and mark by float the predetermined position of the shallow water implant site. They will also mark the reef entrance point, the location of the cable anchor inside the reef cut and the path the Mike boat will take while hauling the cable. (The deep water implant site will be located by Mini-Ranger; see section 3.1.2).

AUTEC personnel will uncover the existing cable trench, and prepare a trench through the beach. These features are detailed in figures (3) and (4). Further reference to these figures will be made in the body of this plan.

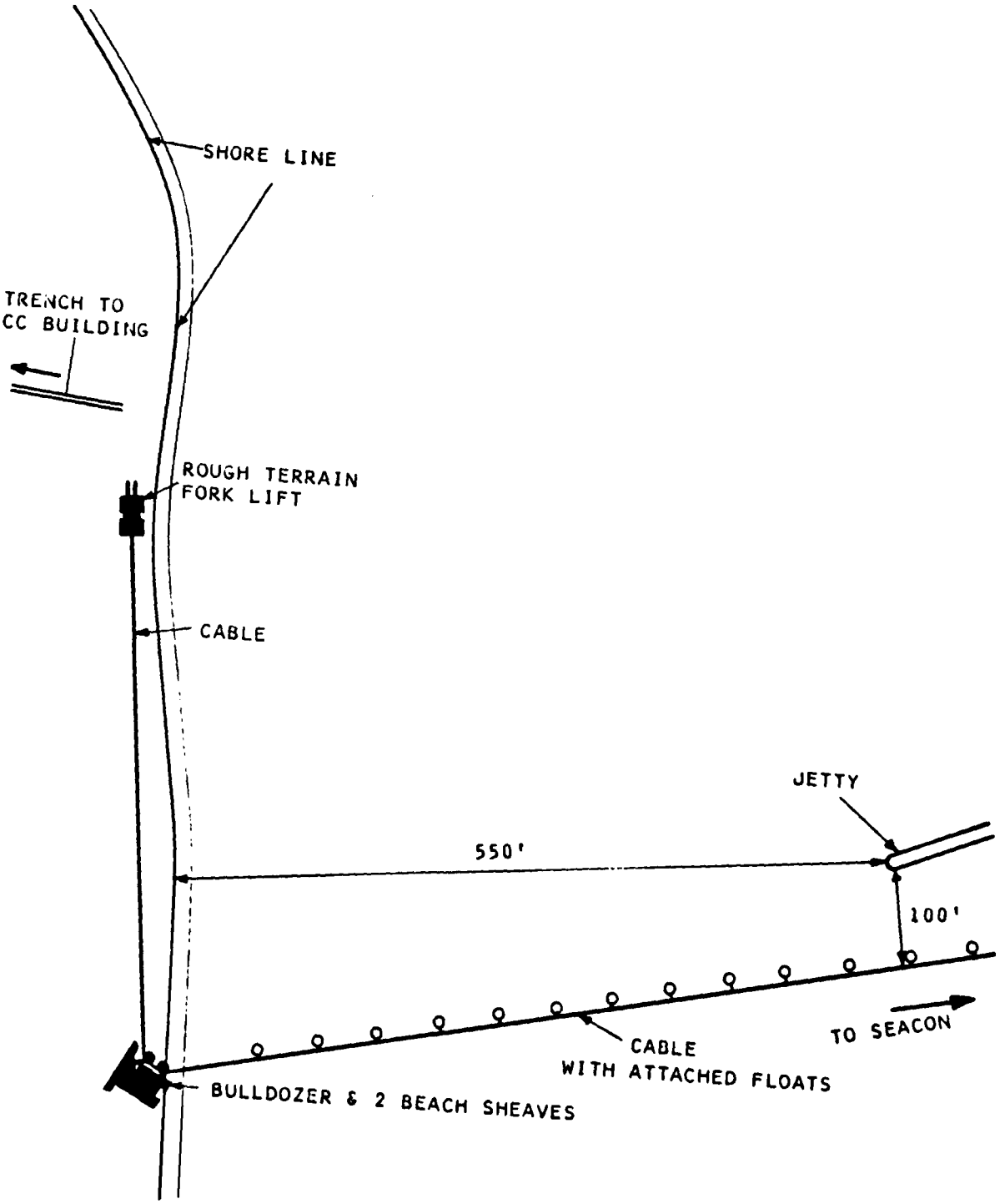
CHESNAVFACENGCOM personnel will set up the Mini-Ranger transponders with support from AUTEC personnel. (These transponders had been shipped in advance to AUTEC; see section 2.0.) The selected sites are detailed in Appendix A.

UCT-1 personnel will rig the inflatable orange and Jim Buoy floats for deployment during the landing operations.

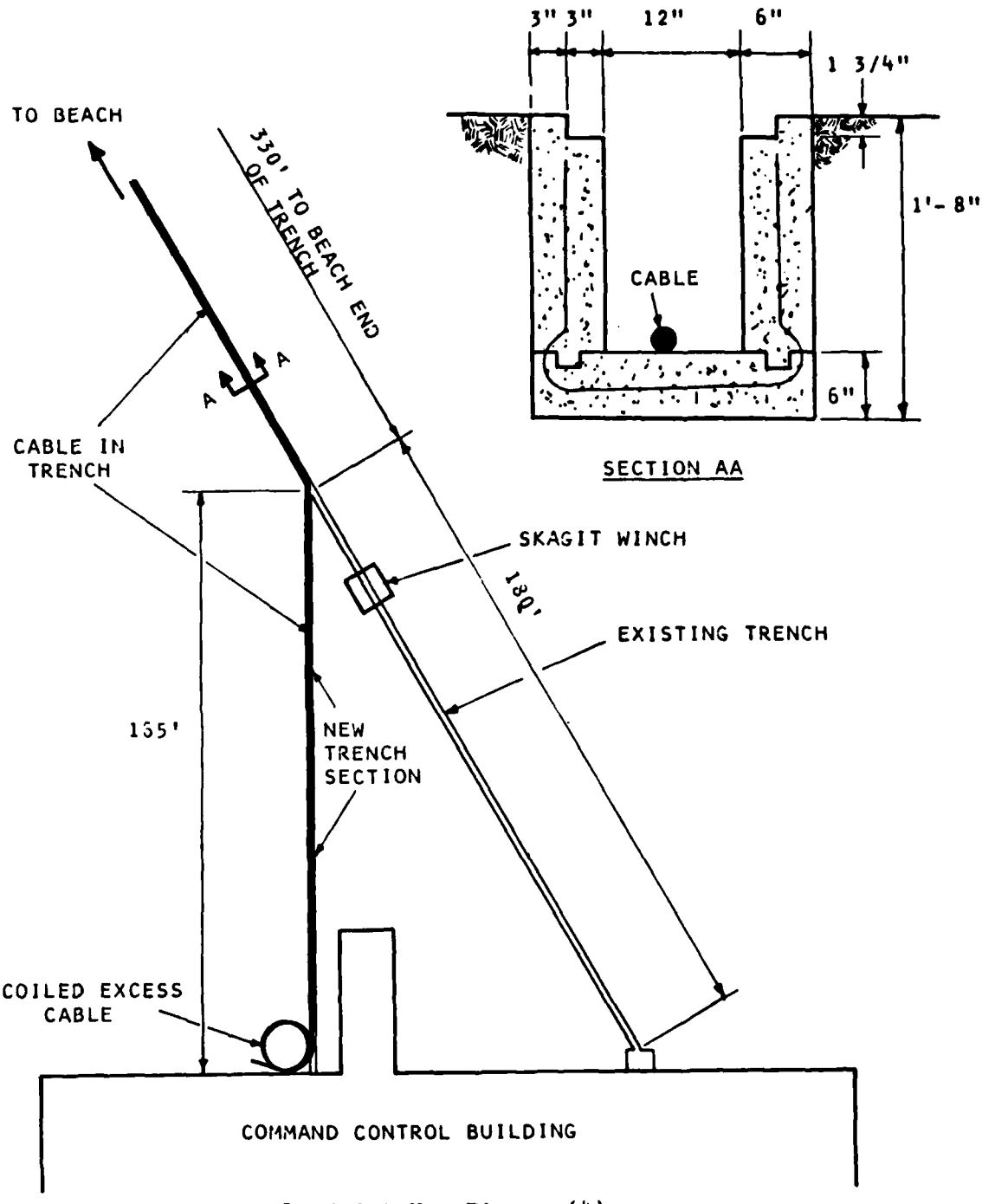


FORACS Target

Figure (2)



Beach Set-Up Figure (3)



Land Set-Up Figure (4)

3.1.1.2 Post-arrival Preparation

SEACON will self-transit to AUTEC. At first light on 2 April 1984 (scheduled) she will be met by an AUTEC supplied Mike boat at the sea buoy. The boat will bring radios out to SEACON for ship to shore communication during operations.

The Skagit winch, beach sheaves and other required beach equipment will be transferred from the SEACON to the Mike Boat using the SEACON's crane. The equipment will be transferred from the Mike boat to a truck at the marina pier using a small crane. (As previously noted, all material handling equipment will be AUTEC supplied). The gear will be transferred to the beach site by truck.

UCT-1 and AUTEC personnel will position the rough terrain forklift and a bulldozer and beach sheaves on the beach for hauling the cable ashore. This beach set-up is shown in figure (3). They will also rig 100 feet of line from the forklift and through the beach sheaves. UCT-1 and AUTEC personnel will position the Skagit winch near the Command Control (CC) building as shown in figure (4), securing it to nearby tree stumps. UCT-1 will mount several sheaves on the trees along the cable trench path.

CHESNAVFACENGCOM and the deck force will check out the Mini-Ranger system, the Pengo winch and other on-board equipment to assure operational status. The reel holding the AUTEC FORACS cable will be loaded on the Pengo winch by the deck force. The deck force will hang a 42 inch diameter sheave from the padeye to the starboard of the ladder on the SEACON A-frame.

3.1.2 FORACS Target Installation

The FORACS cable for the first of the two AUTEC installations will have been connected to the transducer through the junction chamber/strain relief assembly, and tested during pre-departure mobilization at Ft. Lauderdale, as described in section 2.0. In the event this connection was not made prior to departure, the procedure described in section 3.2 for the second FORACS installation should be followed.

Using the Liebherr crane, the deck force will lift the structure by the bail and place it on the stern near the centerline of the A-frame.

SEACON will steam to the deep water implant site and keep station at that location.

The Pengo winch will be used to overboard the structure. The equipment operator must maintain a smooth increase in winch pull to avoid snap loading in the cable. Tag lines will be handled by the deck force to assure control of the structure as it lifts off the deck and through the A-frame. Once stabilized, the structure will be lowered into the water and the tag lines slipped off the structure.

Lowering the structure will continue until it is on the bottom. The observed tension should drop by 2200 pounds when this occurs. This tension drop is significant in all FORACS installation sequences.

APL will again test the system before cable laying operations begin.

3.1.3 Cable Laying

The cable will be laid along a predetermined track at a laying speed of 0.75 knots (76 ft/min). The track lines are given in Appendix A.

3.1.4 Cable Shore Landing

SEACON will continue to lay cable until she is just outside of the relief channel, in about thirty feet of water at the spot marked by the AUTEC divers. Holding this position, additional cable will be paid out until it is vertical in the water. The Master will turn the SEACON 90 degrees, with the cable to the stern and off to one side. SEACON will station keep as the shore landing proceeds. The Mike boat will meet the SEACON at this point.

A deckhand will stop off the cable at the stern to avoid uncontrolled running. APL personnel will again test the system to assure proper operation before landing the cable. The deck force will take out 8500 feet of cable from the reel onto the deck. This length will assure adequate cable is available to complete the connection at the CC building.

A deckhand will cut the cable with a carbide blade hacksaw supplied by APL, seal the cut end to prevent moisture intrusion and secure a PLP stopper to the shore end. A deckhand will slip the cable from the sheave on the A-frame. The deck force will stage 277 floats on the deck. These floats are of two types. The 128 Jim Buoy floats will be deployed first, followed by 149 inflatable orange float balloons. Using this number of floats will utilize approximately 25 percent of the buoyant capacity of the floats. In this way, should one or more floats free themselves during deployment, a domino effect will not sink the cable prematurely.

Deckhands will transfer the bitter end of the cable from the SEACON to the Mike boat, and secure the cable, via PLP stopper, to the boat with about 30 feet of line.

The Mike boat operator will then slowly proceed toward the beach through the reef cut. (The cut had been previously marked by AUTEC divers). As the cable leaves the SEACON, deckhands will tie the floats using 4 foot lengths of 21 thread. The Jim Buoys will be tied every 30 feet and the balloon floats every 50 feet.

The Mike boat will continue hauling the cable shoreward until its draft precludes further advance. At this point a UCT-1 diver will swim the hauling line (previously rigged to the forklift and through the sheaves on the bulldozer ; see section 3.1.1.2) out to the Mike boat, and secure it to the PLP stopper on the cable. Once secured, the line stopping the cable to the Mike boat can be cut.

The forklift operator will begin hauling the remaining cable off the deck of SEACON. As floats reach the beach the shore party will remove them from the cable.

One unobstructed run should be sufficient to haul all the cable onto the beach. If the forklift reaches the limit of its unobstructed haul-in run, the shore party will secure the cable to the bulldozer with a rope stopper. The forklift will return to the bulldozer to pull the next bight of cable. To prevent exceeding the cable's bending radius, two rope stoppers will secure the cable to the forklift. If the cable length exceeds the straight run length, the cable will be carefully faked out onto the beach at the location of the cable trench. Figure (4) shows the site plan.

When all the cable on the SEACON's deck has been hauled onshore, the bulldozer with attached sheaves will be repositioned at the cable trench. (The Skagit winch and sheaves had been previously placed at the CC building and along the trench path; see section 3.1.1.2). The shore party will secure the winch hauling line to the cable end PLP stopper. The winch operator will use the gypsy head to haul the cable toward the CC building. When the cable end reaches the winch, the hauling line will be pulled back along the cable for 400 feet and resecured to the cable using a rope stopper. In this manner the remaining cable will be hauled in along the trench path.

The shore party will manually place the cable into the existing trench. The cable remaining at the trench end will be coiled and left for final testing by APL and eventual connection to Control building electronics.

UCT-1 divers will attach a PLP stopper to the cable in the vicinity of the underwater cable anchor previously marked and then release the floats in the area. The cable will be manhandled into position at this anchor and secured by PLP stopper and shackles. UCT-1 swimmers will then begin releasing floats, to be recovered by UCT-1 personnel in a ZODIAC inflatable boat. Floats will be removed from the shore outward.

When the cable is completely submerged, divers will swim the cable to assure it does not lie on any coral heads and that no kinks exist.

3.2 Shallow Water Target Installation

The installation of the shallow water FORACS target will be similar to that of the deep water target. The target sites and cable track are detailed in Appendix A. Differences between this implant and the previous operation are described below. All other details remain unchanged.

The deck force will pull the bitter end of the FORACS cable off the Pengo winch, reeve it through the sheave on the A-frame, and haul it back to the electronic work shop. There, APL personnel will connect the cable to the transducer through the junction chamber/strain relief assembly. They will test the system, then attach the assembly to the target frame. This procedure is similar to that which will be completed prior to departure from Ft. Lauderdale for the first installation.

All beach equipment will be returned to the position it occupied prior to the first cable landing.

The shallow water implant site is closer to the reef cut, and requires considerably less cable laying. The cable will be laid along a predetermined track at a laying speed of 1.5 knots (152 ft/min).

All other operational details remain unchanged.

3.3 Demobilization

Equipment and personnel will be returned to SEACON at the completion of the second target installation. AUTEC supplied equipment will be returned to the responsible parties. All deck equipment will be rigged for the tow to St. Croix, via NAVSTA Roosevelt Roads, PR, for the second phase of the operation.

4.0 TRANSITION TO ST. CROIX OPERATIONS

The SEACON will be towed by the USS PAIUTE, ATF-159, from AUTEC to St. Croix via NAVSTA Roosevelt Roads.

At NAVSTA Roosevelt Roads additional equipment for the St. Croix phase will be onloaded. The 15,000 pound mooring clump for the SSRNM array, the FORACS cable and a NAVSTA Roosevelt Roads supplied rough terrain forklift will be staged on deck in space previously occupied by hardware installed at AUTEC. The added equipment will be rigged for tow to Fredriksted, St. Croix, USVI.

5.0 OPERATIONS PLAN FOR ST. CROIX

This section covers the installation of one SSRNM Array and one FORACS Target at the St. Croix Underwater Tracking Range. The proposed installation locations, station marks, track line and shore landing coordinates are detailed in Appendix A. The site plan is given in that Appendix as figure (A-2).

5.1 Construction Operations

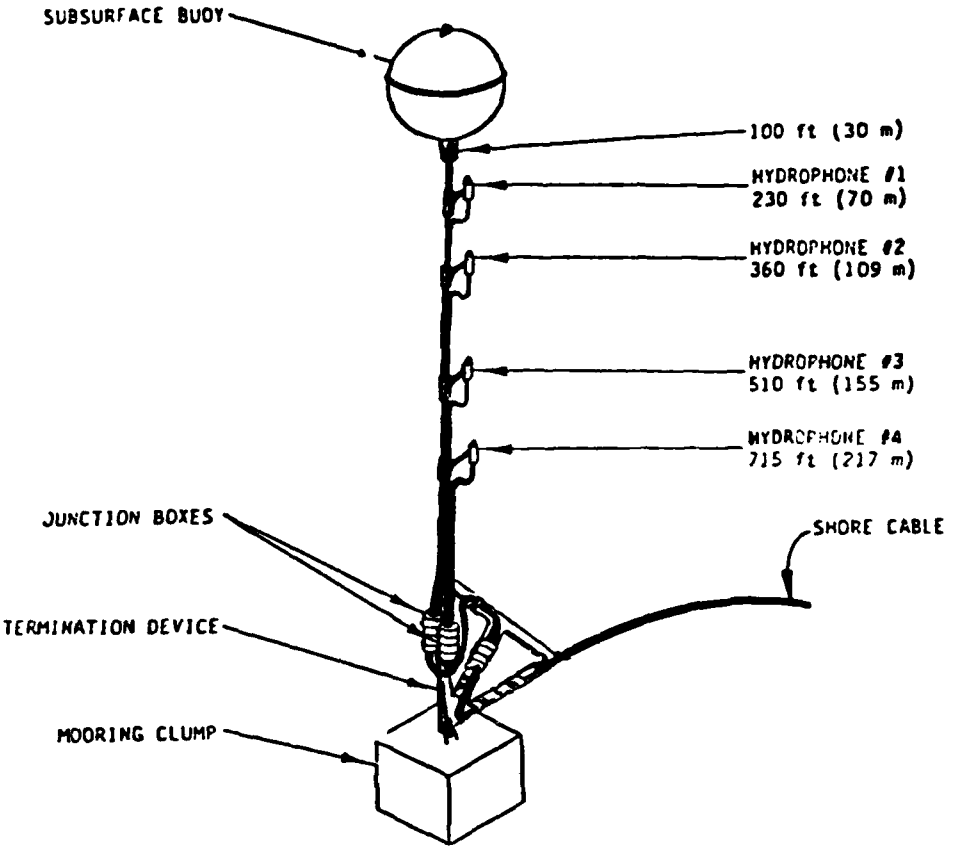
The SSRNM array will be installed in a shore to sea configuration. From a position offshore the shore cable is beached, followed by a seaward cable laying procedure. The array is then lowered at a predetermined location and depth. The SSRNM array is illustrated in figure (5). The site plan and pertinent position coordinates are given in Appendix A. The installation scenario is detailed below in section 5.1.2.

Additionally, a FORACS target will be installed at St. Croix. The site plan, cable track and implant coordinates are given in Appendix A. The installation scenario is detailed below in section 5.1.3.

5.1.1 Site Preparation

Upon arrival at Fredriksted, St. Croix, USVI, the SEACON will tie up at Fredriksted Pier. Pier space for the duration of construction operations has been prearranged with the appropriate command. A two day mobilization period has been scheduled. The activity responsible for each step of this set-up is detailed below.

CHESNAVFACENGCOM will install the Mini-Ranger transponders at the locations detailed in Appendix A. CHESNAVFACENGCOM will also check out the Mini-Ranger hardware onboard SEACON. The deck force will check out the deck mounted equipment.



SSRNM Array

Figure (5)

The deck force will offload the Skagit winch, forklift, beach sheaves, polypropylene hauling line, screw anchors and other required hardware at Fredriksted Pier into a truck for transit to the St. Croix UTR range station.

After offloading the shore based equipment, the deck force will prepare 80 float balloons for deployment during the installation. These floats had been rigged, deployed and recovered during the AUTEC phase of the mission. Any re-rigging required should be completed prior to beginning the installation.

The deck force will then complete deck preparation. A second sheave will be hung from the A-frame, to the port side of the sheave previously installed. The Pengo reel holding the 5/8 inch wire rope overlaid with the Kevlar strength member for the SSRNM array will be mounted on the Pengo winch. The powered reel stand holding the pre-bundled hydrophone cables will have been prepositioned during pre-operation mobilization; see section 2.0.

The shore party will prepare the beach landing site and cable hauling route as detailed in figure (6). The rough terrain forklift will be the primary hauling equipment. The Skagit winch, not shown in figure (6), will be secured with screw anchors near the position shown for the forklift in the figure, but such that it does not interfere with the forklift hauling route, as a backup to the forklift. The sheaves, secured to an existing beach deadman and concrete embedded posts, act as fairleads for the cable haul from the beach. The polypropylene hauling line will be secured to the forklift, reeved through the sheaves and staged at the beach landing site.

5.1.2 SSRNM Array Installation

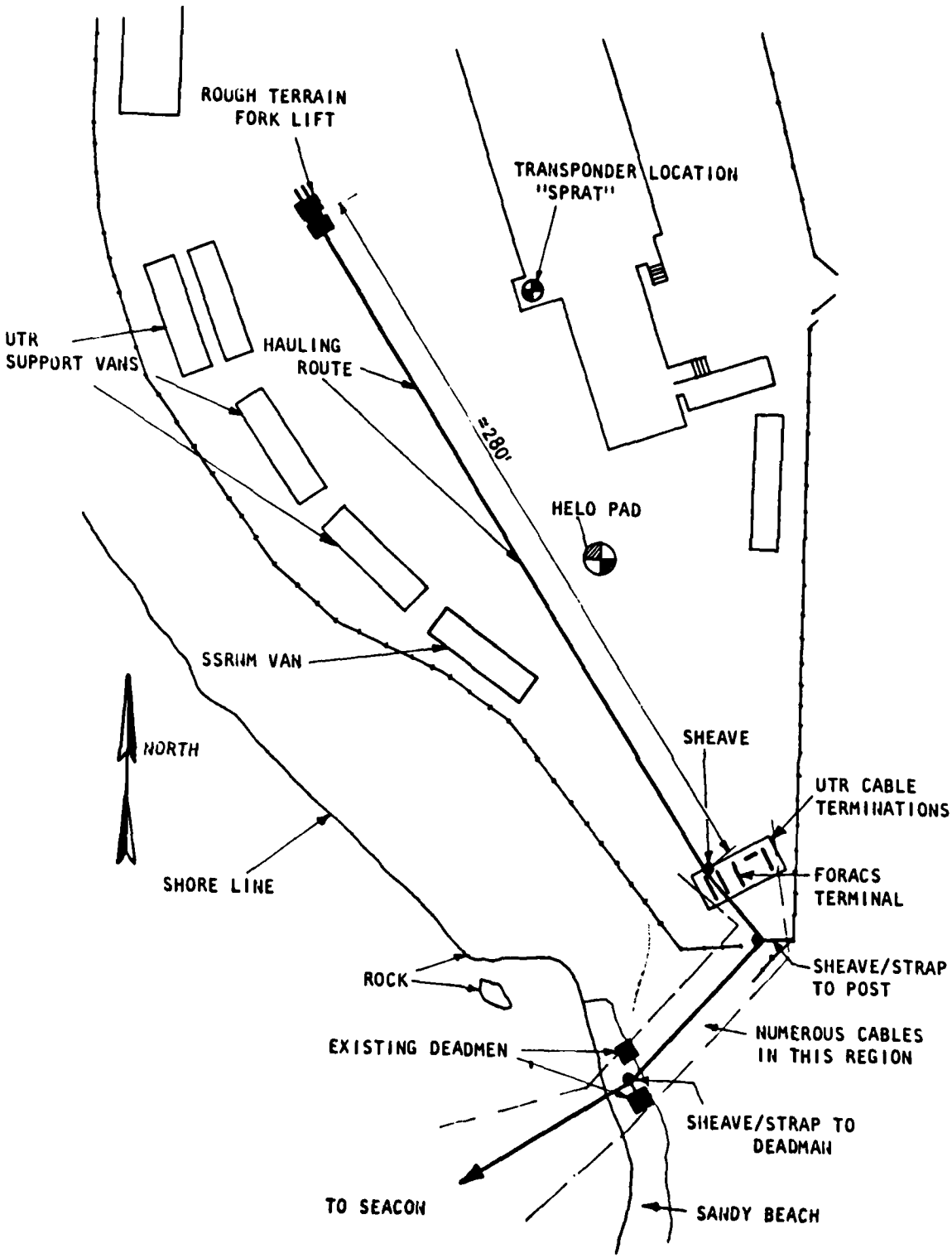
The SSRNM array installation will proceed in three phases; cable shore landing, cable laying and array deployment.

5.1.2.1 Cable Shore Landing

The deck force will deploy station keeping floats at two points in the vicinity of the location from which the SSRNM cable will be landed. This position is given in Appendix B.

Deckhands will attach a PLP stopper to the cable end. This end will be hauled from the cable tank, through the Pengo winch and over the stern roller. A hand will attach a swivel to the PLP stopper with a shackle.

UCT-1 personnel will overboard a ZODIAC and transit to the beach landing site. They will return to SEACON pulling the



Shore Set-Up Figure (6)

hauling line with them. A deckhand will receive the line from the ZODIAC and secure it to the cable end stopper.

When the ready signal is received by the forklift operator, (radios will be used to keep the shore party and the deck force apprised of each other's status), he will begin hauling in the cable. Two deckhands will walk the cable out of the cable tank as it is drawn toward the beach. Deckhands will tie floats to the cable at twenty foot intervals as it reaches the stern .

As the cable arrives on the beach the shore party will release the floats from the cable to allow it to pass through the beach sheaves.

When the forklift reaches the end of its unobstructed haul-in route, the shore party will signal the deck force of the pause in cable payout. The cable (or hauling line as appropriate) will be secured by rope stopper at the concrete pad while the forklift returns to its origin to continue the haul-in. When ready to haul in, the SEACON deckforce will be signaled to again walk cable out of the cable hold.

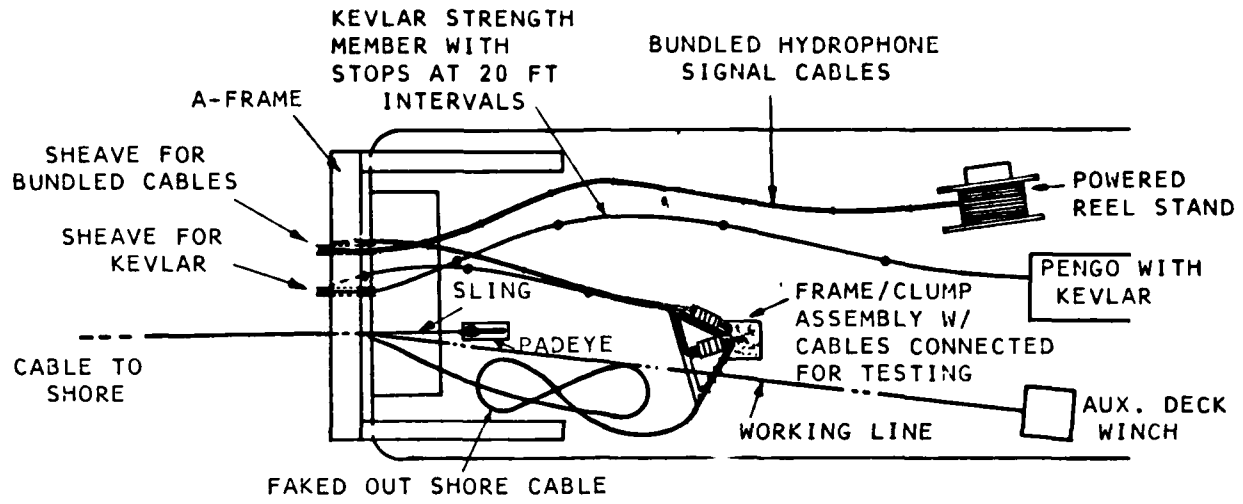
When the cable has been hauled across the beach, up the slope, over the concrete pad and about 250 feet across the grassy area serving as the forklift hauling route, the haul-in procedure is complete. The deckforce will be signaled that sufficient cable is onshore.

The shore party will attach a PLP stopper to the cable at the location of the existing beach deadman. The stopper will be shackled to the deadman.

UCT-1 swimmers will release the floats from the shore out, for recovery with a ZODIAC.

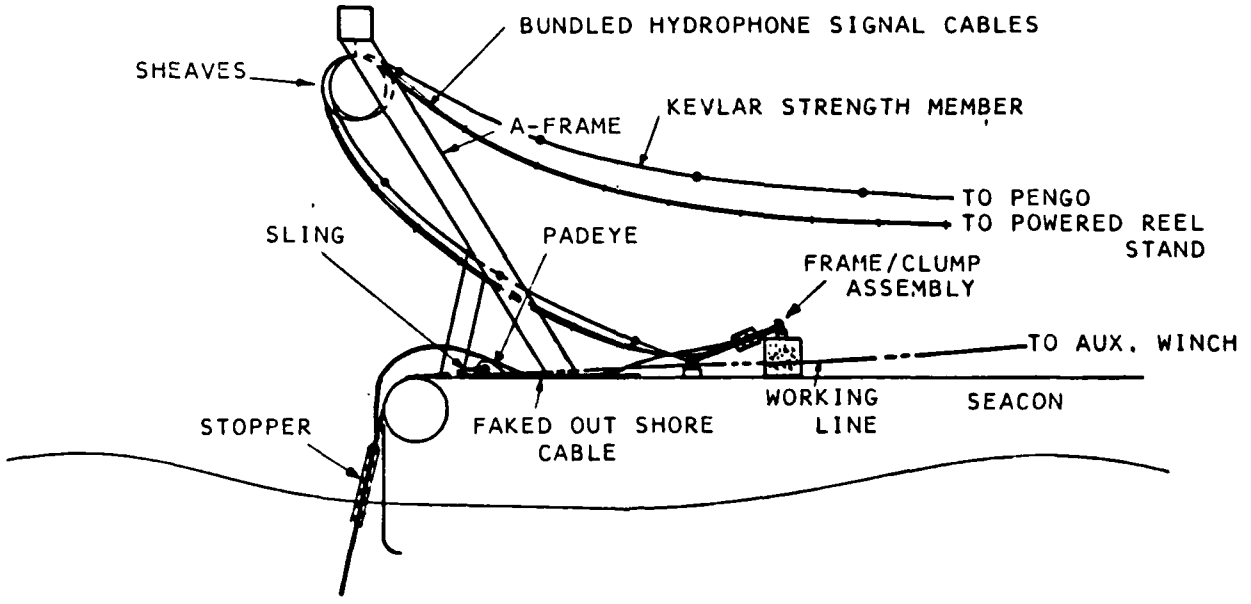
5.1.2.2 Cable Laying

The cable will be laid seaward along a predetermined track at a laying speed of 1.5 knots (152 ft/min). The track lines and other necessary information are given in Appendix B. Cable laying will continue until a position 2500 feet up the track of the proposed final sensor location is reached. Cable payout will continue at this position until coming to the final termination. Deckhands will stop off the cable about 30 feet forward of the termination using both a sling to a deck padeye and a working line to an auxiliary deck winch. The winch operator will let out the working line until the load is taken by the sling. The cable end can then be brought out of the tank and removed from the Pengo winch bullwheels. Figure (7) illustrates this interim configuration, as well as the following preparatory steps in the operation.



PLAN VIEW SHOWING CABLES ATTACHED FOR TESTING

ELEVATION SHOWING SHORE CABLE AROUND A-FRAME



Array Installation Set-Up

Figure (7)

5.1.2.3 SSRNM Array Deployment

The deck force will pass the Kevlar strength member from the Pengo reel through the sheave nearest the centerline of the A-frame. They will pass the pre-bundled hydrophone signal cables from the powered reel stand through the second A-frame sheave.

The deck force will attach a shackle between the triangular frame and the mooring clump, and shackle the Kevlar to the triangular frame. These connections are detailed in figure (8).

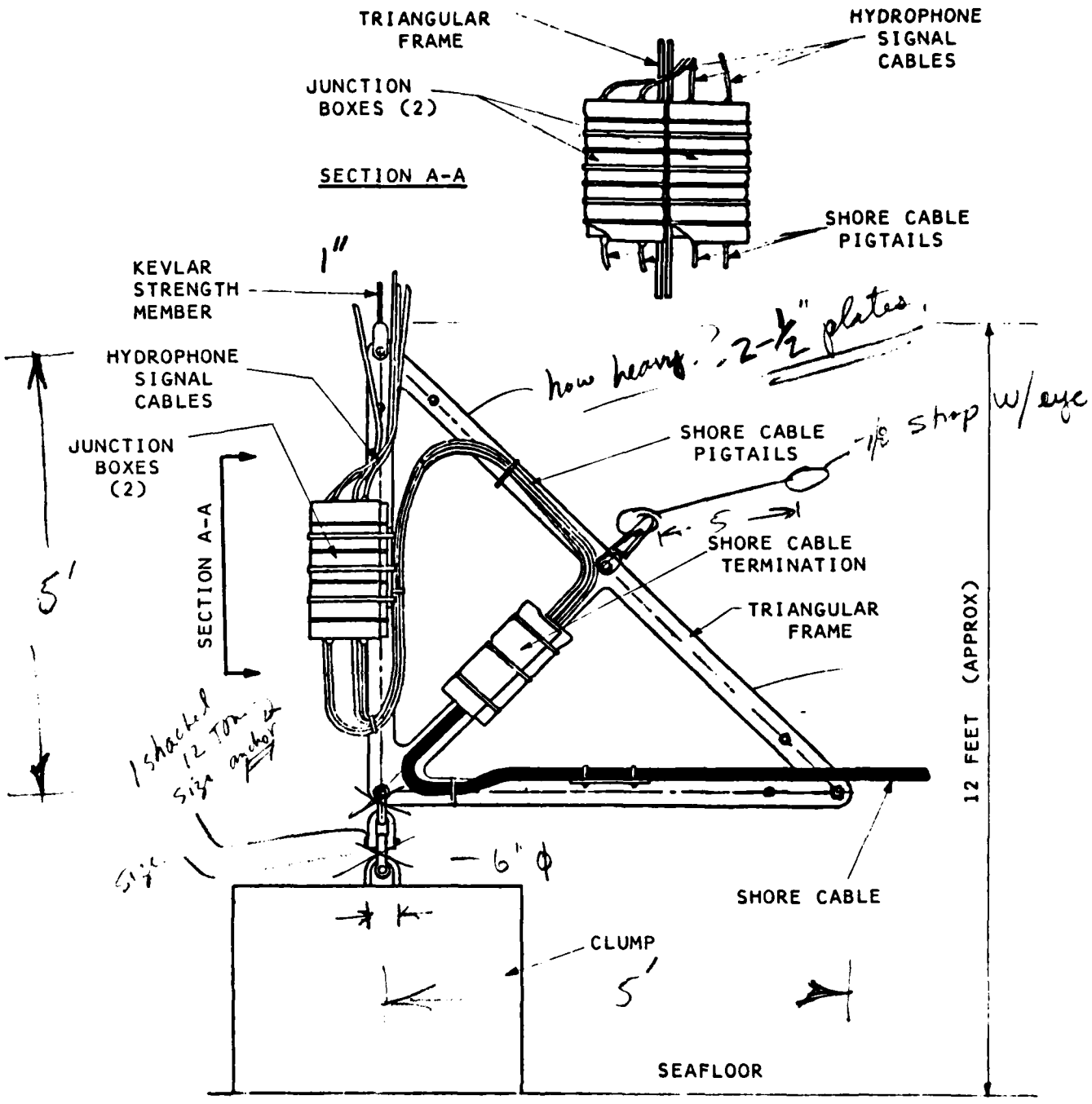
NOSC personnel will attach the shore cable to the strain relief on the frame, secure the junction boxes to the frame, and connect the shore cable pigtails and hydrophone signal cables to their respective mates. These connections will be carefully checked by NOSC personnel to assure each is properly completed before proceeding. NOSC personnel will then test the system. The deck force will bind the first 10 feet of bundled cables to the Kevlar line with nylon cable ties.

The auxiliary winch operator will pull the stopper onto the deck, relieving the load in the sling. A deckhand will remove the sling.

The deckforce will rig a working line from the Liebherr crane, walk the frame/clump assembly aft and stage it at the SEACON stern under the A-frame. The Pengo winch operator will haul in the Kevlar line to remove the slack in the line and take up the frame/clump load. A deckhand will disconnect the working line to the Liebherr crane.

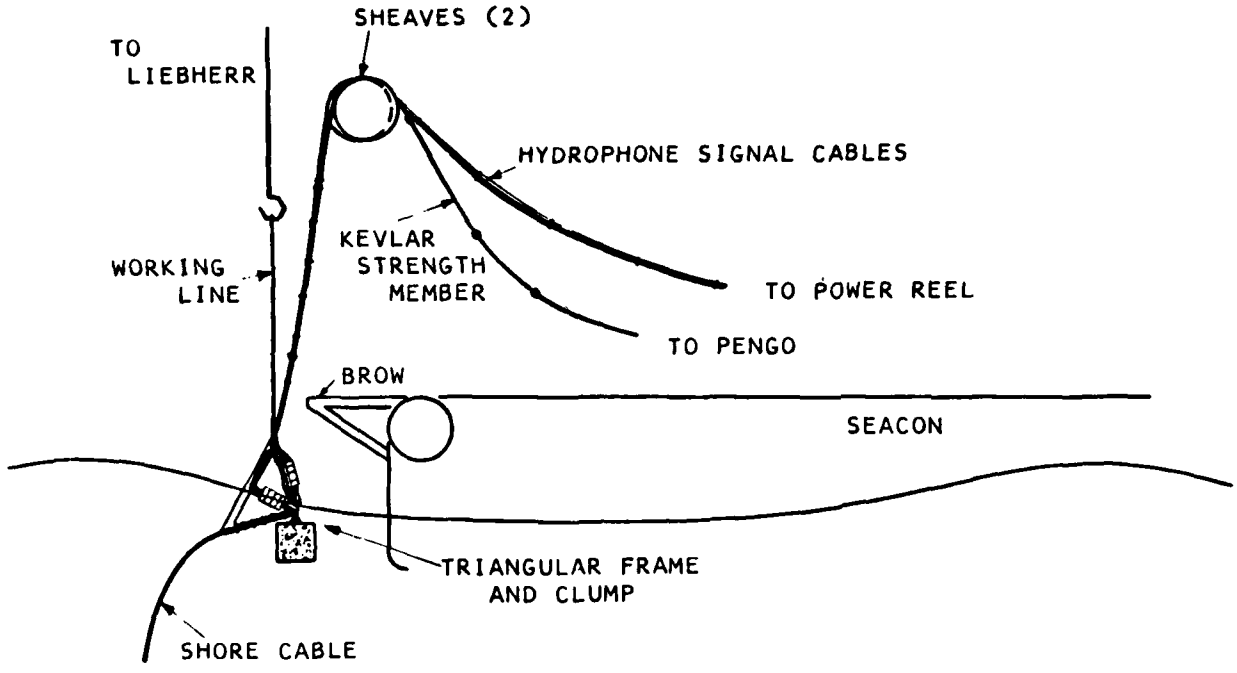
The Pengo winch operator will continue to draw in the Kevlar line until the frame/clump assembly lifts off the deck and hangs under the A-frame. Deckhands will handle tag lines to assure control of the assembly as it lifts off the deck. The auxiliary winch operator will lower the PLP stopper on the shore cable until that load is also taken by the Kevlar strength member and the Pengo winch. A deckhand will cut the working line to the stopper.The Pengo winch operator will begin lowering the array.

As the cable bundle is lowered, the deckforce will bind it to the Kevlar strength member at intervals of 5 to 10 feet, as shown in figures (9) and (10), taking care to place no strain on the sensor cables. While lowering the array, SEACON will proceed toward the final implant site. Forward progress along the track must correspond foot for foot to the length of Kevlar paid out, so that the clump will touch down at the implant site.



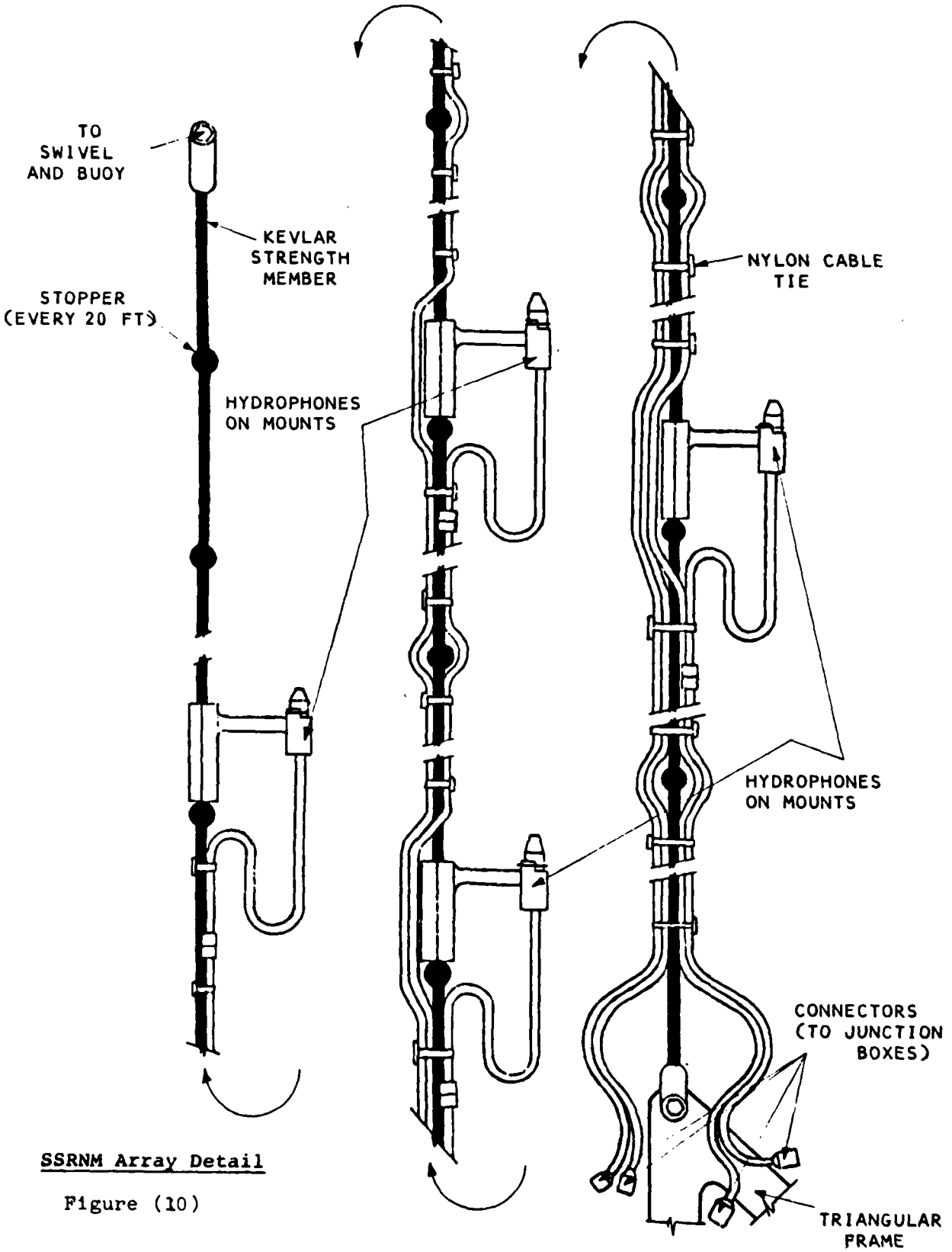
Triangular Frame and Clump

Figure (8)



Deployment of Triangular Frame and Clump

Figure (9)



SSRNM Array Detail

Figure (10)

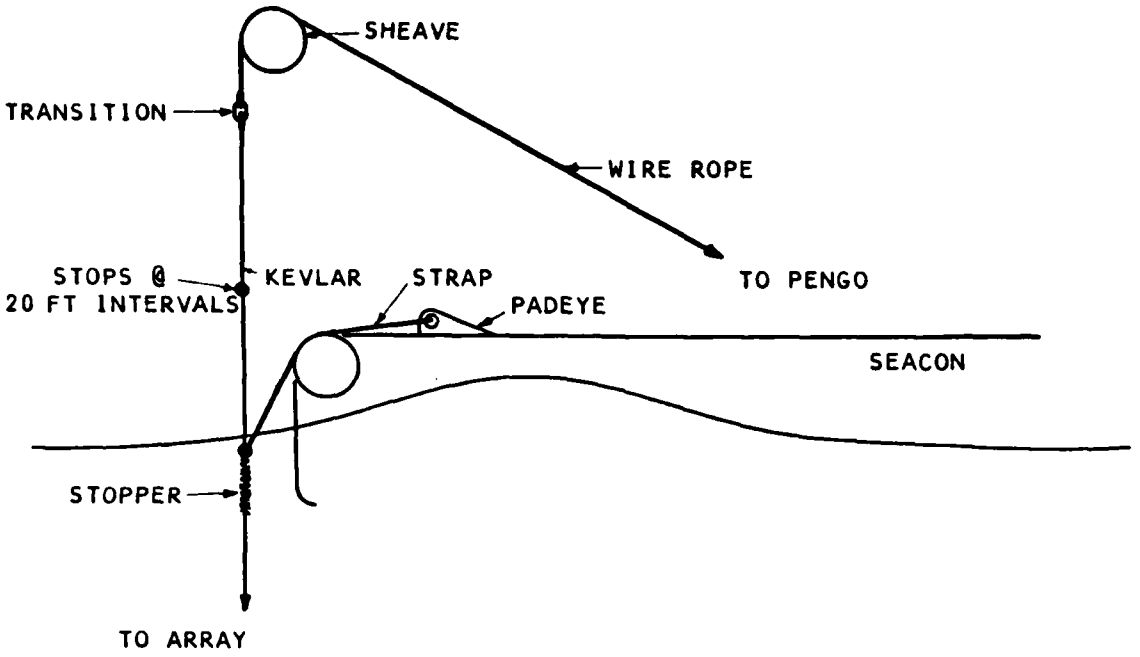
The hydrophone positions in the array will be clearly indicated by the sensor cable terminal connectors for each respective instrument. As each such position is encountered, the Pengo winch operator will stop lowering while the deck force secures the hydrophone and hanger assembly to the Kevlar. NOSC personnel will complete the sensor cable connections and test each instrument before proceeding with lowering the array.

Approximately 500 feet of 5/8 inch wire rope underlays and is attached to the Kevlar strength member on the Pengo reel. When that junction passes through the sheave, a deckhand will stop off about 20 feet of the Kevlar to a deck padeye. The Pengo operator will gently ease down the array, slowly reducing the tension in the wire rope. This procedure is illustrated in figure (11-a).

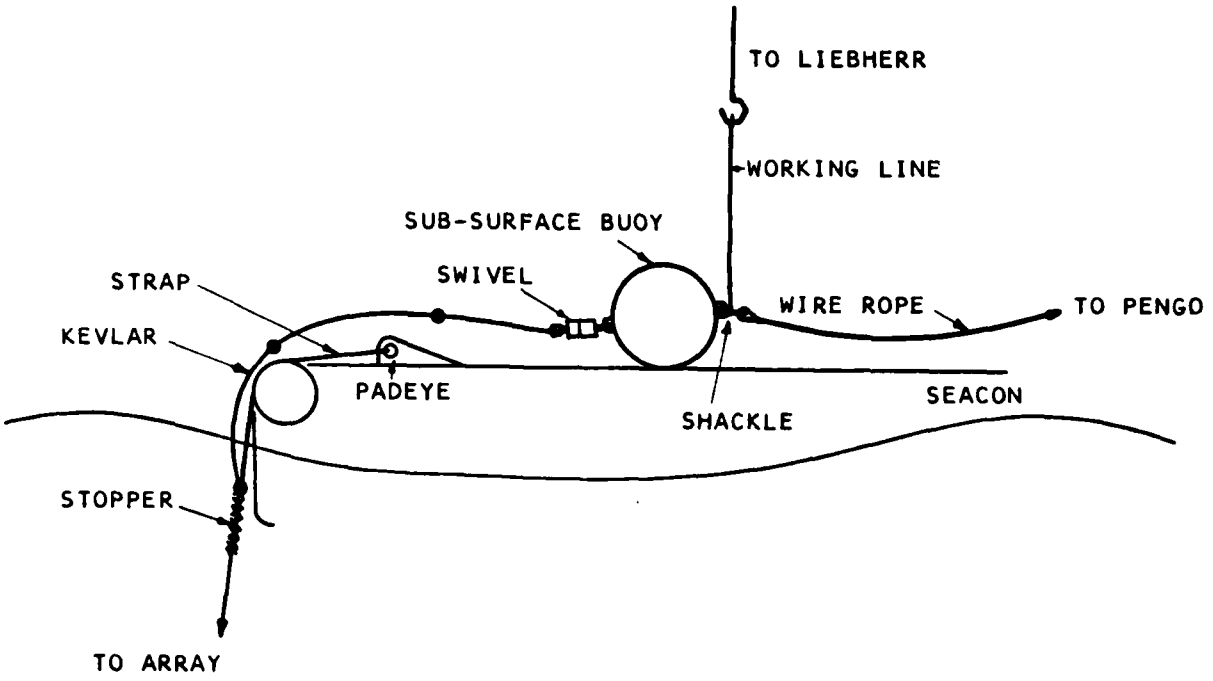
A deckhand will disconnect the wire rope from the Kevlar. The Pengo winch operator will then back the wire rope out of the sheave, leaving enough wire rope on the deck to prepare the sub-surface buoy assembly.

Figure (11-b) illustrates the sub-surface buoy preparation. Deckhands will attach a swivel to the assembly's bottom padeye and secure the Kevlar strength member to the swivel. They will shackle the wire rope to the top padeye of the assembly and then secure a working line to that shackle. They then will attach a hydraulic cable cutter and a pneumatic hose with depth gauge to the wire rope at the shackle, both with 200 feet of hose. The cable cutter will allow remote cutting of the wire rope, without sending divers to the design depth of 100 to 115 feet. The pneumatic hose will allow remote depth readings to verify the proper deployment depth has been achieved.

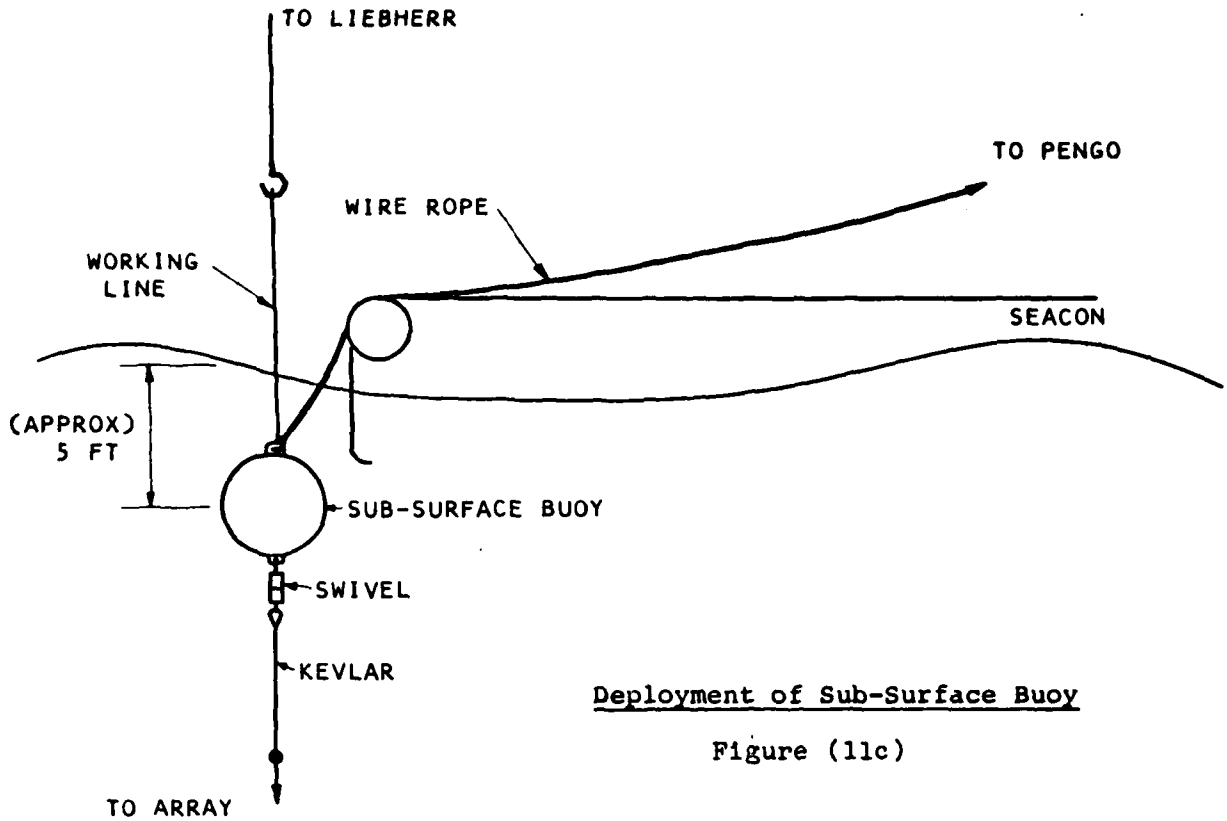
The Liebherr crane operator will gently lift the assembly by the working line as deckhands monitor the lift to assure no damage is done to the buoy assembly. When the load in the stopper holding the Kevlar is relieved, a deckhand will release that stopper. The Liebherr crane operator will then lower the assembly until signaled by a monitor that the buoy is about 5 feet below the surface. This deployment sequence is illustrated in figure (11-c). The Pengo winch operator will then transfer the load onto the wire rope by hauling in any existing slack. A deckhand will cut the working line to the Liebherr crane, and the Pengo winch operator will continue lowering the array. When the clump rests on the bottom the tensiometer will indicate the large drop in tension in the wire rope.



Kevlar/Wire Rope Transition Figure (11a)

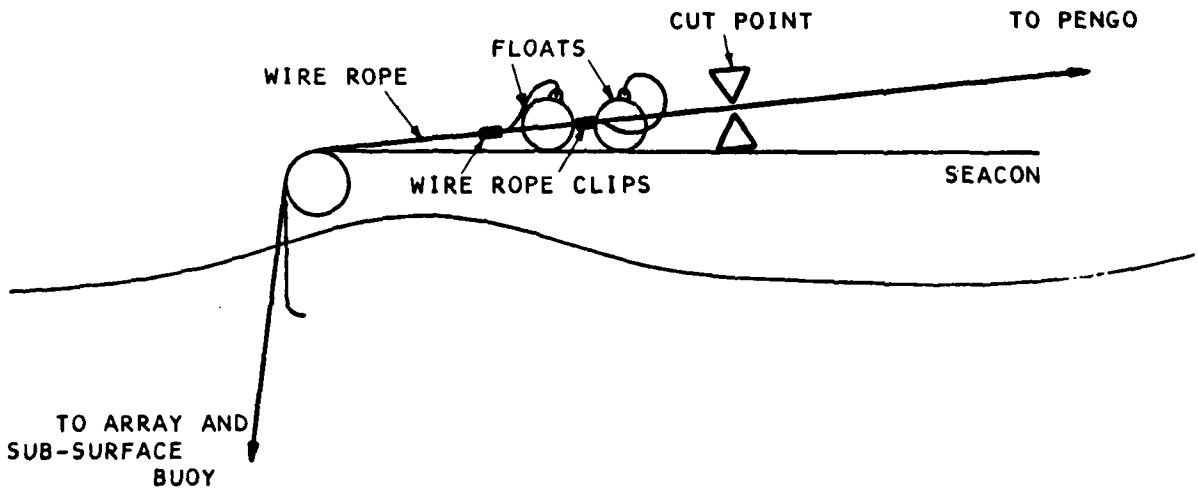


Sub-Surface Buoy Preparation Figure (11b)



Deployment of Sub-Surface Buoy

Figure (11c)



Wire Rope Cut-off Figure (11d)

A deckhand will read the pneumatic depth gauge. If that gauge indicates the top of the buoy is at a depth between 100 and 115 feet, the procedure which follows will be completed. If the buoy is not within this critical depth range, the entire array will be re-lifted and set down about 30 feet from the initial touchdown point, repeating until the proper depth is achieved. The depth of the sub-surface buoy, not the position of the clump on the bottom is the critical parameter in this deployment.

Deckhands will then secure two floats to the wire rope with wire rope clips, and then cut the wire rope on the deck as illustrated in figure (11-d). The floats should be walked over the stern to avoid loosening the clips as they pass over the stern.

The Barge Master will hold SEACON about 20 feet from the floats while the deckforce remotely cuts the wire rope at the buoy. In the event of wire rope cutter failure, UCT-1 divers will, by necessity, serve as back up. Should this occur, deckhands will drop the hoses and SEACON will move well clear of the dive area. Divers will follow the hoses down to the sub-surface buoy, and disconnect the shackle holding the wire rope. Deckhands, using a ZODIAC if necessary, will recover the wire rope, cable cutter and hoses.

5.1.3 FORACS Target Installation

The installation of the FORACS Target at St. Croix will be similar to that at AUTEC. The installation scenario is described below.

5.1.3.1 Site Preparation

The site plan shown in figure (5) for the SSRNM array installation will be used for the FORACS Target installation. The forklift will be used to haul the cable to the termination position, rather then the Mike boat used in the previous operation. The winch will again serve as backup to the forklift. The shore party will secure the hauling line to the forklift and reeve it through the sheaves down the slope to the beach. The hauling line will be staged on the beach.

The deck force will mount the St. Croix FORACS cable reel on the Pengo winch. The procedure detailed in section 2.2 will be executed to prepare the target for deployment.

5.1.3.2 Cable Laying

After target deployment the cable will be laid along a predetermined track at a laying speed of 1.5 knots (152 ft/min). The track lines are given in Appendix B. Cable laying will continue until SEACON reaches a 30 foot water depth, approximately 1700 feet offshore.

5.1.3.3 Cable Shore Landing

Holding position in 30 feet of water, additional cable will be paid out until it is vertical in the water. The Barge Master will turn SEACON 90 degrees with the cable to the stern and to one side. SEACON will keep station as the shore landing proceeds.

A deckhand will stop off the cable at the stern to avoid uncontrolled running. APL personnel will test the system before landing the cable. The deck force will fake out 2000 feet of cable from the reel onto the deck. This length will assure adequate cable is available to complete the connection at the junction box. A deckhand will cut the cable with a carbide blade hacksaw supplied by APL, seal the cut end to prevent moisture intrusion and secure a PLP stopper to the shore end. A deckhand will slip the cable from the sheave on the A-frame. The deckforce will stage 100 Jim Buoy floats on the deck, re-rigging as necessary.

Using a ZODIAC, UCT-1 personnel will bring the hauling line from the beach out to the SEACON. Deckhands will secure the line to the PLP stopper at the end of the cable. The forklift operator will be signaled to begin hauling cable toward the beach. Deckhands will tie floats to the cable at 20 foot intervals as it reaches the SEACON stern.

The forklift operator will continue the haul-in along the route shown in figure (5). As cable reaches the beach, the shore party will release the floats.

When all the cable faked out on SEACON's deck has been hauled shoreward, the deck monitor will signal the forklift operator to cease hauling. The shore party will attach a PLP stopper to the cable at the position of the existing beach deadman. The stopper will be shackled to the deadman.

APL personnel will again test the system before the cable is sunk in place. Swimmers will release floats from the shore out for recovery by ZODIAC. The cable will be connected at the FORACS Target junction box by St. Croix UTR personnel.

5.1.3.4 Second FORACS Target Installation

An additional FORACS Target, to be placed in shallow water, and sufficient cable to complete its installation will be onboard SEACON. Should the built-in contingency days leave sufficient time before the scheduled tow, this second FORACS Target will be installed at St. Croix. The installation scenario will be identical to that for the FORACS Target installation detailed above. Target position, track lines, etc. have been included in Appendix B for this second installation.

6.0 DEMOBILIZATION

Upon completion of the FORACS Target installation, the beach equipment will be returned to SEACON and rigged for tow. The SEACON will be towed to NAVSTA Roosevelt Roads for the return of borrowed equipment. The tow will continue to Port Everglades, FL, where demobilization will be completed.

7.0 PROJECT DOCUMENTATION

A completion report documenting the entire construction operation will be completed by CHESNAVFACENGCOM and forwarded to all concerned commands within 90 days of demobilization.

APPENDIX A

NAVIGATION OPERATIONS
AND
TRANSPONDER LOCATIONS

NAVIGATION OPERATIONS

The Boat Positioning System (BPS) is designed to determine accurately the position of a boat, ship, or any other mobile floating unit. This position is determined by obtaining ranges from two transponder reference stations located at known, fixed points ashore. The BPS consists of a ranging system, a mini-computer processor, various displays, a magnetic cartridge tape recorder, an X-Y plotter, and interconnecting cables. The ranging system used is a Motorola MRS III (Mini-Ranger) consisting of a shipboard receiver-transmitter assembly with space diversity antennas, a range console, and two or more shore-based transponders with individual antennas. It has an accuracy of $\pm$ 3 meters at up to a line of sight range of 40 NM.

The Motorola Data Processor provides the mathematical computation and the data input/output controls. The processor accepts the operator inputs via the keyboard, a Texas Instruments TI-743 KRS Data Terminal, or Tektronic 4025 Data Terminal, and the dual ranges from the Mini-Ranger and converts these into an X-Y coordinate system; it computes the deviation from an operator-defined track line. The data can be recorded and/or displayed on a variety of peripherals.

The Mini-Ranger displays the ranges (constantly updated) from the ship to the two shore-based transponders. The data processor displays the system status via eight mnemonically labeled lights. Either Range-Range, X and Y, or the distance along the track line and offset from one track line are displayed on the Data Terminal.

The BPS will be used as the primary navigation system for positioning the SEACON during installations and for navigation along the selected cable laying tracks. Range theodolite and acoustic tracking will backup the BPS, within limitations as required.

The Mini-Ranger shore stations, and FORACS Target and SSRNM Array implant site coordinates are given on the following pages.

The tables and charts which follow these data detail the cable laying tracks, ship speeds, and payout rates for each of the installations to be executed during this mission.

TABLE A-1 AUTEC MINI-RANGER TRANSPONDER LOCATIONS AND FORACS TARGET IMPLANT COORDINATES

AUTEC TRANSPONDER LOCATIONS

Location	Coordinates
North Tower	47625 N 11430 E
Instrument Tower	38159 N 13617 E

AUTEC DEEP WATER FORACS TARGET

Implant Site	44120 N 20675 E
Shore Landing Station	40460 N 19000 E

AUTEC SHALLOW WATER FORACS TARGET

Implant Site	41720 N 19800 E
Shore Landing Station	40460 N 19000 E

TABLE A-2 ST. CROIX TRANSPONDER LOCATIONS
SSRNM ARRAY AND FORACS TARGET IMPLANT COORDINATES

ST. CROIX TRANSPONDER LOCATIONS

Location	UTR	UTM	PRD
Sandy Point	59272.9 X 15130.4 Y	1955343.62 N 298412.91 E	17°40'46.757" N 64°54'00.959" W
Sprat	61997.9 X 37859.1 Y	1962263.27 N 299312.80 E	17°44'32.105" N 64°53'32.789" W

UTR: Underwater Tracking Range Coordinate System (To be used)
UTM: Universal Transverse Mercator
PRD: Puerto Rican Datum

ST. CROIX SSRNM ARRAY

Location	Coordinates
Implant Site	52986 X 35029 Y
Holding Point	54692 X 35390 Y
Turning Point	55450 X 35550 Y
Landing Point	60400 X 36975 Y

ST. CROIX DEEP WATER FORACS TARGET

Implant site	58302 X 28774 Y
Landing point	60400 X 36975 Y

ST. CROIX SHALLOW WATER FORACS TARGET

Implant site	60334 X 34225 Y
Landing point	60400 X 36975 Y

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: AUTEC & ST. CROIX OPS Station: E S R: Contract:
Calcs made by: date: Calcs ck'd by: date:	Calculations for:

AUTEC DEEP WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
DUMP	1920 FEET		200	200	1210				1920
0.75	63.1	1.47	500	365	1158	-0.31	5	61.27	2162
0.75	63.1	1.47	1000	883	980	-0.33	5	59.89	2556
0.75	63.1	1.47	1250	1155	860	-0.42	5	55.50	2738
0.75	63.1	1.47	1500	1420	675	-0.61	5	46.19	2890
0.75	63.1	1.47	1750	1688	505	-0.57	5	48.23	3049
0.75	63.1	1.47	2000	1947	200	-0.87	5	35.02	3164
0.75	63.1	1.47	2250	2235	130	-0.24	5	64.97	3378
0.75	63.1	1.47	2500	2488	80	-0.20	5	67.46	3600
0.75	63.1	1.47	3000	2990	60	-0.04	5	77.11	4107
0.75	63.1	1.47	3500	3490	50	-0.02	5	78.44	4623
0.75	63.1	1.47	4000	3995	35	-0.03	5	77.79	5135
DUMP	6650 FEET								11785

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

GPO 888-883

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: AUTEC & ST. CROIX OPS Station: E S R: Contract:
Calcs made by: date: Calcs ck'd by: date:	Calculations for:

AUTEC DEEP WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
DUMP	1920 FEET		200	200	1210				1920
0.75	63.1	1.47	500	365	1158	-0.31	10	65.07	2177
0.75	63.1	1.47	1000	883	980	-0.33	10	63.69	2596
0.75	63.1	1.47	1250	1155	860	-0.42	10	59.30	2791
0.75	63.1	1.47	1500	1420	675	-0.61	10	49.99	2955
0.75	63.1	1.47	1750	1688	505	-0.57	10	52.03	3127
0.75	63.1	1.47	2000	1947	200	-0.87	10	38.82	3254
0.75	63.1	1.47	2250	2235	130	-0.24	10	68.77	3480
0.75	63.1	1.47	2500	2488	80	-0.20	10	71.26	3715
0.75	63.1	1.47	3000	2990	60	-0.04	10	80.91	4247
0.75	63.1	1.47	3500	3490	50	-0.02	10	82.24	4788
0.75	63.1	1.47	4000	3995	35	-0.03	10	81.59	5325
DUMP	6650 FEET								11975

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: AUTEC & ST. CROIX OPS Station:
Calcs made by: _____ date: _____ Calcs ck'd by: _____ date: _____	E S R: _____ Contract: _____ _____ Calculations for: _____

AUTEC SHALLOW WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
DUMP	685 FEET		100	100	80				685.00
1	63.1	1.10	400	367	65	-0.06	5	102.96	989.83
1	63.1	1.10	500	467	65	0.00	5	106.40	1094.83
1	63.1	1.10	600	570	60	-0.05	5	103.42	1196.90
1	63.1	1.10	700	672	57	-0.03	5	104.58	1300.11
1.5	63.1	0.73	1000	943	51	-0.02	5	158.31	1612.57
1.5	63.1	0.73	1100	1048	47	-0.04	5	157.39	1716.11
1.5	63.1	0.73	1200	1152	43	-0.04	5	157.36	1819.65
1.5	63.1	0.73	1300	1256	40	-0.03	5	157.92	1923.54
1.5	63.1	0.73	1400	1361	36	-0.04	5	157.39	2027.09
1.5	63.1	0.73	1500	1463	33	-0.03	5	157.89	2130.97
1.5	63.1	0.73	1563	1527	30	-0.05	5	156.88	2195.99
DUMP	6650 FEET						TOTAL CABLE OUT		8845.99

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

GPO 885-883

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: AUTEC & ST CROIX OPS Station:
Calcs made by: date: Calcs ck'd by: date:	E S R: Contract: Calculations for:

AUTEC SHALLOW WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
DUMP	685 FEET		100	100	80				685.00
1	63.1	1.10	400	367	65	-0.06	10	108.03	1004.83
1	63.1	1.10	500	467	65	0.00	10	111.46	1114.83
1	63.1	1.10	600	570	60	-0.05	10	108.49	1221.90
1	63.1	1.10	700	672	57	-0.03	10	109.65	1330.11
1.5	63.1	0.73	1000	943	51	-0.02	10	165.91	1657.57
1.5	63.1	0.73	1100	1048	47	-0.04	10	164.98	1766.11
1.5	63.1	0.73	1200	1152	43	-0.04	10	164.96	1874.65
1.5	63.1	0.73	1300	1256	40	-0.03	10	165.52	1983.54
1.5	63.1	0.73	1400	1361	36	-0.04	10	164.98	2092.09
1.5	63.1	0.73	1500	1463	33	-0.03	10	165.49	2200.97
1.5	63.1	0.73	1563	1527	30	-0.05	10	164.48	2269.14
DUMP	6650 FEET						TOTAL CABLE OUT		8919.14

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

CHESAPEAKE DIVISION	PROJECT: AUTEC & ST CROIX OPS
Naval Facilities Engineering Command NDW	Station:
DISCIPLINE	E S R: Contract:
Calcs made by: date:	Calculations for:
Calcs ck'd by: date:	

ST. CROIX SSRMM ARRAY - CABLE PAYOUT TABLE

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
1.5	65	0.756	1500	1470	30		10		2000.00
1.5	65	0.756	2000	1960	40	0.020	10	168.43	2554.07
1.5	65	0.756	2500	2410	85	0.100	10	173.34	3124.28
1.5	65	0.756	3000	2835	150	0.152	10	176.66	3705.43
1.5	65	0.756	3500	3075	395	0.796	10	228.12	4455.85
1.5	65	0.756	4000	3260	680	0.995	10	250.83	5280.96
1.5	65	0.756	4500	3525	890	0.670	10	215.99	5991.50
1.5	65	0.756	5000	3860	1015	0.357	10	190.68	6618.74
1.5	65	0.756	5500	4250	1130	0.287	10	185.69	7229.58
1.5	65	0.756	6000	4650	1215	0.209	10	180.44	7823.14
1.5	65	0.756	6500	5015	1340	0.330	10	188.72	8443.97
1.5	65	0.756	7000	5390	1460	0.310	10	187.29	9060.08
1.5	65	0.756	7500	5715	1620	0.457	10	198.18	9712.00
1.5	65	0.756	7800	5880	1725	0.567	10	206.96	10120.49
CABLE DUMP 1700FEET			7800	7800	2250				11820.49

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

CHESAPEAKE DIVISION	PROJECT: AUTEC & ST CROIX OPS
Naval Facilities Engineering Command NDW	Station:
DISCIPLINE	E S R: Contract:
Calcs made by: date:	Calculations for:
Calcs ck'd by: date:	

ST. CROIX SSRNM ARRAY - CABLE PAYOUT TABLE

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
1.5	65	0.756	1500	1470	30		5		2000.00
1.5	65	0.756	2000	1960	40	0.020	5	160.83	2529.07
1.5	65	0.756	2500	2410	85	0.100	5	165.74	3074.28
1.5	65	0.756	3000	2835	150	0.152	5	169.06	3630.43
1.5	65	0.756	3500	3075	395	0.796	5	220.52	4355.85
1.5	65	0.756	4000	3260	680	0.995	5	243.23	5155.96
1.5	65	0.756	4500	3525	890	0.670	5	208.40	5841.50
1.5	65	0.756	5000	3860	1015	0.357	5	183.08	6443.74
1.5	65	0.756	5500	4250	1130	0.287	5	178.09	7029.58
1.5	65	0.756	6000	4650	1215	0.209	5	172.84	7598.14
1.5	65	0.756	6500	5015	1340	0.330	5	181.12	8193.97
1.5	65	0.756	7000	5390	1460	0.310	5	179.69	8785.08
1.5	65	0.756	7500	5715	1620	0.457	5	190.58	9412.00
1.5	65	0.756	7800	5880	1725	0.567	5	199.36	9805.49
CABLE DUMP 1700FEET			7800	7800	2250				11505.49

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

GPO 889-883

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: AUTEC & ST CROIX OPS Station: E S R: Contract:
Calcs made by: date: Calcs ck'd by: date:	Calculations for:

ST. CROIX DEEP WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
	63.1		200	200	1280		5		1990.00
1	63.1	1.101	1000	380	1245	-0.192	5	95.08	2740.66
1.5	63.1	0.734	2000	650	1220	-0.092	5	154.29	3755.75
1.5	63.1	0.734	2500	1180	1190	-0.057	5	156.32	4269.99
1.5	63.1	0.734	3000	1745	1160	-0.053	5	156.52	4784.89
1.5	63.1	0.734	3500	2280	1112	-0.089	5	154.45	5292.97
1.5	63.1	0.734	4000	2870	1020	-0.155	5	150.80	5789.03
1.5	63.1	0.734	4500	3500	922	-0.154	5	150.82	6285.16
1.5	63.1	0.734	5000	4120	793	-0.205	5	148.02	6772.09
1.5	63.1	0.734	5500	4750	673	-0.188	5	148.95	7262.06
1.5	63.1	0.734	6000	5430	513	-0.231	5	146.61	7744.34
1.5	63.1	0.734	6500	6080	373	-0.212	5	147.64	8230.01
1.5	63.1	0.734	7000	6700	273	-0.160	5	150.51	8725.12
1.5	63.1	0.734	7500	7350	144	-0.196	5	148.53	9213.71
1.5	63.1	0.734	8000	7880	104	-0.075	5	155.25	9724.42
1.5	63.1	0.734	8500	8440	74	-0.054	5	156.50	10239.23
1.5	63.1	0.734	9000	8950	44	-0.059	5	156.20	10753.06
1.5	63.1	0.734	9300	9260	30	-0.045	5	156.98	11062.90
CABLE DUMP	1800 FEET							TOTAL OUT	12862.90

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

CHESAPEAKE DIVISION	PROJECT: AUTEC & ST CROIX OPS
Naval Facilities Engineering Command NDW	Station:
DISCIPLINE	E S R: Contract:
Calcs made by: date:	Calculations for:
Calcs ck'd by: date:	

ST. CROIX BEEP WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
	63.1		200	200	1280		10		1990.00
1	63.1	1.101	1000	380	1245	-0.192	10	100.15	2780.66
1.5	63.1	0.734	2000	650	1220	-0.092	10	161.89	3845.75
1.5	63.1	0.734	2500	1180	1190	-0.057	10	163.92	4384.99
1.5	63.1	0.734	3000	1745	1160	-0.053	10	164.12	4924.89
1.5	63.1	0.734	3500	2280	1112	-0.089	10	162.05	5457.97
1.5	63.1	0.734	4000	2870	1020	-0.155	10	158.40	5979.03
1.5	63.1	0.734	4500	3500	922	-0.154	10	158.42	6500.16
1.5	63.1	0.734	5000	4120	793	-0.205	10	155.62	7012.09
1.5	63.1	0.734	5500	4750	673	-0.188	10	156.55	7527.06
1.5	63.1	0.734	6000	5430	513	-0.231	10	154.21	8034.34
1.5	63.1	0.734	6500	6080	373	-0.212	10	155.24	8545.01
1.5	63.1	0.734	7000	6700	273	-0.160	10	158.11	9065.12
1.5	63.1	0.734	7500	7350	144	-0.196	10	156.13	9578.71
1.5	63.1	0.734	8000	7880	104	-0.075	10	162.85	10114.42
1.5	63.1	0.734	8500	8440	74	-0.054	10	164.10	10654.23
1.5	63.1	0.734	9000	8950	44	-0.059	10	163.80	11193.06
1.5	63.1	0.734	9300	9260	30	-0.045	10	164.58	11517.90
CABLE DUMP	1800 FEET							TOTAL OUT	13317.90

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

GPO 885-883

CHESAPEAKE DIVISION Naval Facilities Engineering Command NDW DISCIPLINE	PROJECT: AUTEC & ST CROIX OPS Station:
Calcs made by: date: Calcs ck'd by: date:	E S R: Contract: Calculations for:

ST. CROIX SHALLOW WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
	63.1		100	100	175		5		780.00
1	63.1	1.101	575	510	135	-0.097	5	100.52	1251.19
1.5	63.1	0.734	1000	870	117	-0.050	5	156.70	1689.35
1.5	63.1	0.734	1250	1150	90	-0.096	5	154.07	1942.77
1.5	63.1	0.734	1500	1420	75	-0.055	5	156.38	2199.99
1.5	63.1	0.734	1750	1680	65	-0.038	5	157.36	2458.82
1.5	63.1	0.734	2000	1945	50	-0.057	5	156.32	2715.94
1.5	63.1	0.734	2250	2210	38	-0.045	5	156.97	2974.13
1.5	63.1	0.734	2500	2460	38	0.000	5	159.59	3236.63
1.5	63.1	0.734	2750	2710	38	0.000	5	159.59	3499.13
1.5	63.1	0.734	3000	2965	35	-0.012	5	158.91	3760.50
1.5	63.1	0.734	3250	3220	30	-0.020	5	158.45	4021.12
Cable Dump	1800 FEET							Total Out	5821.12

TABLE A-3 CABLE PAYOUT RATES

page ___ of ___

CHESAPEAKE DIVISION	PROJECT: AUTEC & ST CROIX OPS
Naval Facilities Engineering Command NDW	Station:
DISCIPLINE	E S R ____ Contract:
Calcs made by: ____ date:	Calculations for:
Calcs ck'd by: ____ date:	

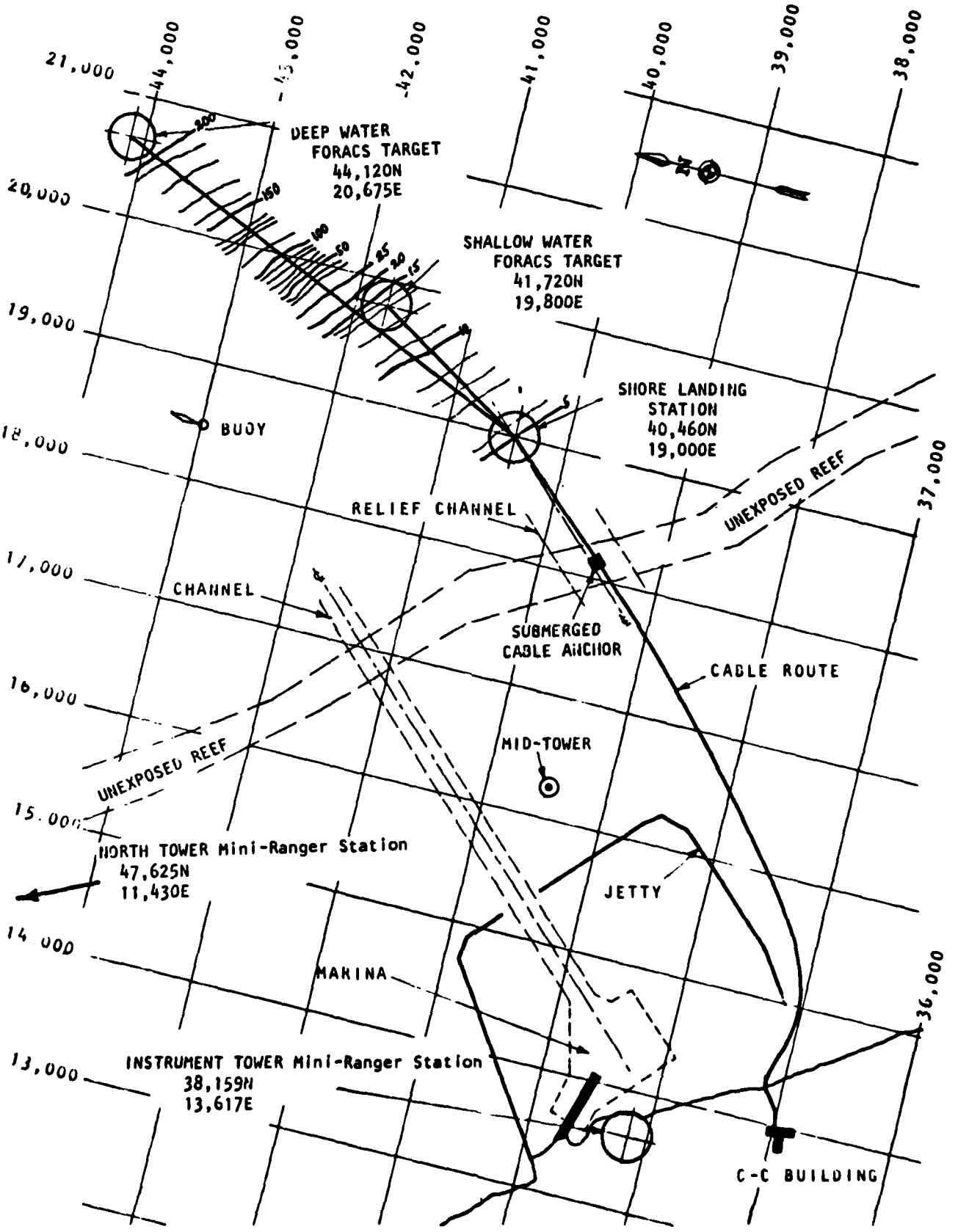
ST. CROIX SHALLOW WATER FORACS TARGET

VESSEL SPEED KTS	HYDRO CONST DEGREE-KT	ALPHA RADIAN	TRACK FT	TOUCH DOWN X FT	TOUCH DOWN Y FT	BOTTOM SLOPE RADIAN	SLACK %	PAYOUT RATE FT/MIN	CABLE OUT FT
	63.1		100	100	175		10		780.00
1	63.1	1.101	575	510	135	-0.097	10	105.58	1274.94
1.5	63.1	0.734	1000	870	117	-0.050	10	164.30	1734.35
1.5	63.1	0.734	1250	1150	90	-0.096	10	161.67	2000.27
1.5	63.1	0.734	1500	1420	75	-0.055	10	163.98	2269.99
1.5	63.1	0.734	1750	1680	65	-0.038	10	164.96	2541.32
1.5	63.1	0.734	2000	1945	50	-0.057	10	163.92	2810.94
1.5	63.1	0.734	2250	2210	38	-0.045	10	164.57	3081.63
1.5	63.1	0.734	2500	2460	38	0.000	10	167.19	3356.63
1.5	63.1	0.734	2750	2710	38	0.000	10	167.19	3631.63
1.5	63.1	0.734	3000	2965	35	-0.012	10	166.51	3905.50
1.5	63.1	0.734	3250	3220	30	-0.020	10	166.05	4178.62
Cable Dump	1800 FEET							Total Out	5978.62

TABLE A-3 CABLE PAYOUT RATES

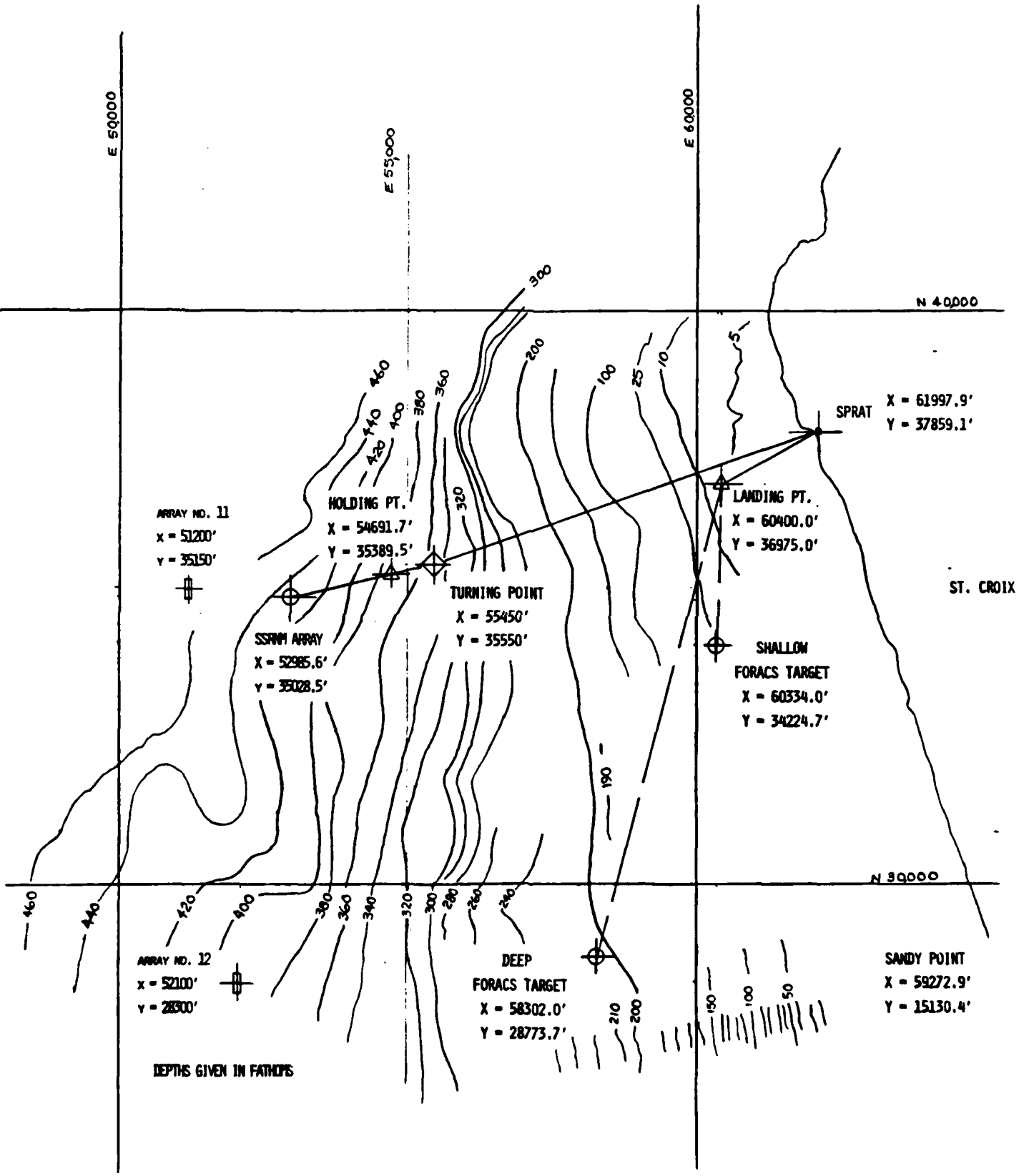
page ____ of ____

GPO 888-883



SITE PLAN FOR AUTEC INSTALLATIONS

Figure A-1



SITE PLAN FOR ST. CROIX INSTALLATIONS

Figure A-2

APPENDIX B

LIST OF EQUIPMENT

LIST OF EQUIPMENT

CHESNAVFACENGCOM:

1. OCP SEACON and crew
2. A-frame and stern brow
3 Powered reel stand with hydraulic power pack
4. Two 126 inch, one 96 inch, Pengo reels
5. 18k Skagit winch
6. Pengo winch
7. Wire rope clips
8. Motorola Mini-Ranger onboard SEACON including transponders and peripheral equipment
9. Wire rope hardware for ten straps
10. Eight Motorola Walkie Talkies
11. Four 42 inch sheaves
12. Two 35 inch sheaves
13. Assorted shackles
14. Twelve PLP stoppers
15. 149 inflatable float balloons, orange
16. 128 Jim Buoy floats
17. Three rolls 1 inch circumference polypropylene line
18. 4800 feet 1-1/2 inch circumference manila rope
19. 600 feet 5/8 inch diameter wire rope
20. Four screw anchors
21. One pair jack stands

UCT-1:

1. Dive gear
2. Two ZODIAC inflatable boats
3. Hydraulic cable cutter with 200 foot hose
4. 200 foot pneumatic hose with depth gauge

NOSC:

1. Structures, cable, hydrophones and installation hardware for four FORACS Targets and one SSRNM Array
2. Assembled SSRNM junction boxes
3. SSRNM electronic testing equipment

APL:

1. Assembled FORACS junction boxes
2. FORACS electronic testing equipment

AUTEC:

1. Means for on site transportation of equipment and personnel
2. Batteries for Mini-Ranger transponders
3. Equipment necessary to provide range tracking as backup for Mini-Ranger
4. Work boat and operator

St. Croix UTR:

1. Means for on site transportation of equipment and personnel
2. Equipment necessary to provide range tracking as backup for Mini-Ranger